Technical Area: Visual Plume

Data Request 147 Rev: During the November 13, 2001 Data Requests Workshop CEC staff requested clarification on the description of large, medium, and small plumes..

Response: The plumes discussed in Data Request 147 which are associated with the Olive Plant typically occur during low atmospheric conditions from November through February. The older Olive units will only be used to satisfy peak load conditions during the summer months when plumes will not be visible. The approximate sizes of these plumes are:

- Small – Less than 25 yards long;
- Medium – 25 to 50 yards long; and
- Large – Greater than 50 yards long.

No photo documentation of historic plumes was available.

Technical Area: Visual Plume

Data Request 151 Rev: The November 5, 2001 data responses contained information on the exhaust flowrate and temperature for the cooling tower. This information was provided to the CEC staff for the purpose of modeling potential cooling tower vapor plumes using the SACTI model with five years of meteorological data. During the November 13, 2001 Data Responses Workshop URS generally discussed the results of the modeling using this data. Staff requested formal submittal the SACTI results. In addition, CEC staff noted that their independent analysis indicated the cooling tower exhaust should be 5° F lower.

Response: Revised modeling of the potential cooling tower vapor plumes for the proposed Magnolia Power Project was performed using 5 years of meteorological data obtained at the Burbank Municipal Airport. The results of the revised analysis are presented in Table VIS-1. The results do not demonstrate a significant change in predicted plume dimensions (length, height, or radius) or in the number of hours of potential ground level fogging as compared to previously submitted results. All analysis done to date has been based on a heat rejection rate of 243 MW from the cooling tower.

Revised estimates of probable plume length for the worst-case 5 percent plume configuration show an average 18 percent increase for non-fog hours. Average worst-case plume height is predicted to be approximately 18 percent higher using the revised meteorological data set and the predicted worst-case plume radius is estimated to be 36 percent lower during non-fog hours. For the typical 50 percent scenario, the relative change in all probable plume configurations is less.

Estimates of ground level fogging in the direction of Interstate 5 (plume headings of NE to SE) are less than 0.4 hours (24 minutes) for the entire 5 year period and are not anticipated to reach the interstate. This does not represent a significant impact to motorist safety.

Table VIS-1

	Plume Length (m)	Plume Height (m)[1]	Plume Radius (m)	Fogging NE-SE[2] (hrs/pd.)
All Daytime Hours, 5%	625	143	41	0.0 / 20,335
All Daytime Hours, 50%	156	28	15	
All Hours, 5%	371	70	41	0.4 / 40,440
All Hours, 50%	161	28	15	
All Nighttime, 5%	384	71	43	0.4 / 20,105
All Nighttime, 50%	168	33	14	
All No Fog/Rain, 5%	293	68	38	0.4 / 37,063
All No Fog/Rain, 50%	159	28	15	
Daytime, No Fog/Rain, 5%	261	71	32	0.0 / 18,564
Daytime, No Fog/Rain, 50%	154	25	14	
Nighttime, No Fog/Rain, 5%	307	68	41	0.4 / 18,499
Nighttime, No Fog/Rain, 50%	164	32	14	

1 Plume height does not include the height of the cooling tower (release point).

2 Number of hours of predicted fogging / number of hours modeled for a particular condition. All fogging predicted to occur between NE and SE plume headings (heading towards I-5) is predicted to occur within 100 meters of the cooling tower.

The cooling tower was designed based on a 95 F ambient temperature and 26.6% relative humidity, with the plant at base load and the duct burners at maximum firing. Note that the plant is heavily duct fired and most likely has higher cooling tower duties than other 1x1 combined cycle plants. The cooling tower design includes an allowance for recirculation and a L/G ratio of 1.68 was used. During detailed design of the facility, additional heat loads have been placed on the cooling towers. These heat loads are associated with other cooling facility equipment and refinements in the cooling system design. The changes have resulted in an increase in the total heat rejection from the cooling tower from 243 MW to 252 MW. CEC staff's analysis was based on a Marley cooling tower with a lower L/G ratio and a slightly lower cooling tower duty.

This 3.7 percent increase in heat rejection may result in a nominal increase in the amount of water vapor released into the atmosphere, potentially leading to a minor increase in the dimensions of the cooling tower plume. The SACTI model conservatively assumes the peak rejection rate for the entire year, including winter months when water vapor plumes are most probable. This represents a conservative approach. In addition, the increase in heat rejection is also likely to be accompanied by an increase in cooling tower air flow rates and exhaust temperatures that would serve to increase mixing and dispersion and may potentially offset increases in visible plume formation resulting from the increase in water vapor emissions.